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AIR SAMPLING AND ANALYSIS FINAL REPORT RICHARDSON FLATS PARK CITY, UTAH

AUGUST 1992

ADMINISTRATIVE
DEPARTMENT



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EXECUTIVE SUMMARY

On June 10 and 11, 1992 five (5) sampling locations were selected to ascertain the extent of heavy metal contaminated suspended particulate matter migration in the air pathway from the site known as Richardson Flats, Park City, Utah. Eighty-plus (80%) percent of the 160 acre subject area is "covered" with various types of grasses and bush. This cover has been placed there by the potentially responsible party (PRP). The PRP denied the Environmental Protection Agency (EPA) site access thereby limiting sampling locations to the property's perimeter boundary. While split samples were requested by the PRP, collocated samples were provided as filter splits are not possible. Seventeen (17) samples were submitted for analysis. No samples indicated detectable levels of cadmium, lead or arsenic. Four samples at four different locations, two each on different days indicated traces levels of zinc at the limit of quantitation level of the analytical method. The results indicate no release of heavy metal contaminated particulate matter from Richardson Flats. (Refer to Discussion section).

INTRODUCTION

On June 10, 11, 1992, air samples were collected at the Richardson Flats site in Park City, Utah for the purpose of assessing the extent of migration of heavy metal contaminated particulate matter from exposed, potentially air entrainable tailing piles. This sampling will attempted to identify any changes in the migration of air contaminants since the time of the original sampling effort conducted by the Ecology & Environment Field Investigation Team in July 1986. At the time of this sampling effort, most of the 160 acre subject area was not covered/vegetated. In addition, Hazardous Ranking Scoring (HRS) was previously based on photo-documentation of wind blown tailing material.

BACKGROUND

In brief synopsis, the site is located 3.5 miles northeast of Park City, Summit County, Utah. From 1975 to 1981, the 160 acre site was used for placement of mine tailings from mines owned by the United Park City Mines (UPCM). Tailings were placed at depths of up to ten feet. In 1983, UPCM began to use soil to cover the tailings. This is an on-going project which was approximately seventy-five percent complete during the time of a site visit in April, 1992. A security fence has been put in place surrounding the site. Also, the site is a municipal/sanitary landfill. This land was leased by UPCM to the city of Park City and was used for landfill purposes in the mid 1970's. In 1990, a highway was placed through the middle of the landfill creating two sections (one on each side of the highway.) Refuse in the path of the highway was removed, placed on top of the undisturbed landfill sections and covered with soil.

The site lies in a rural area with very widely scattered residences. It is within 1.5 miles of Prospector Square, a new

residential community which supports Park City. Only three residences are within a one mile radius of the site. Types of material handled by this facility are mine tailings and municipal/sanitary refuse. The volumes of contaminated materials to be addressed are 2 million tons of mine tailings and an unknown quantity of municipal/sanitary refuse. The contaminants of concern are metals from the mine tailings, potential metals, volatile organics, BNA's, and pesticides from the landfill.¹

METHODOLOGIES

Logistical complications precluded our use of Hi-Volume samplers in this effort. Medium volume samplers (10 liters per minute) were utilized with a 0.8 micron, 37 millimeter mixed cellulose-ester filter over an 8 hour sample period. The total sample volumes were minimum of 4155 liters. For details, refer to Section 2.0 Methodology of the Response, Engineering, Analytical Contract (REAC) report in Appendix A. Samples were prepared by the procedures set forth in the 40 Code of Federal Regulation (CFR) Part 50, Appendix G:Reference Method for the Determination of Lead in Suspended Particulate Matter Collected for Ambient Air. The solutions from the digested samples were analyzed by National Institute of Occupational Safety & Health (NIOSH) Method 7300 for Elements. For details, refer to Appendix B.

METEOROLOGY

Historical information indicates the Richardson Flats tailings lie in a small topographic basin of approximately 800 acres. The configuration of the basin was expected to have a pronounced effect on local air flow. The basin is situated at 6600 feet elevation and is surrounded by ridges of the Wasatch Mountains that range from 6700 to 7600 feet in height. Silver Creek enters the basin from the west-southwest then angles to the north. Daytime up valley air flows were anticipated to originate from the west, northwest.² This, however, were not the conditions we experienced while sampling. It would have been to our benefit had the winds held true to anticipated behavior as our sample locations in closest proximity to the exposed piles were on the southern side of the property boundary.

On June 10, 1992, frontal movement created wind activities with no relative consistency. At 21% overall, winds originated from the southwest at 7-10 knots (18%) and 11-16 knots (3%). As displayed in modified Figure 1, winds were extremely inconsistent over the course of the sample period. It is difficult to designate one sample location over the other as upwind and downwind locations. Based upon time percentages, Location 2 would qualify as upwind. None of the other samples were situated "downwind" for any extended length of time.

On June 11, 1992, relatively stable winds persisted throughout the course of the sampling effort. Winds emanated from the southeast

approximately 94% of the day and due east 5% maintaining speed of 11-16 knots 34% of the day and 7-10 knots 63 %. Such winds assign upwind positions to locations 1 and 2, and relative downwind to 4,5, and 3 respectively. See modified Figure 1, June 11, 1992.

RESULTS/DISCUSSION

Table 1, Air Sampling Results, summarizes the samples and locations which showed any detectable levels for the compound of concern: lead, cadmium, arsenic and zinc. Table 1.1 displays tabulated results for all compounds. The only contaminant detected at any level was zinc at 0.0001 mg/m^3 ($0.1\mu\text{g}/\text{m}^3$) which is the limit of quantitation for the analysis. These levels were noted at locations 1 (County Road East) and 3 (Highway 40) on the 10th and 4 (NW corner of the site) and 5 (Highway 248) on the 11th.

No samples on any day under any wind condition exhibited elevated levels of contaminants. June 11th sampling was a better sampling day with respect to the ability to assign "classic" upwind-downwind sampling locations. In lieu of this scenario, $0.0001\text{mg}/\text{m}^3$ of zinc at locations 4 and 5 and versus nondetects and 1 and 2 is still negligible and should not be viewed as a release.

It is worth noting that restriction from site access precluded the implementation of the optimum sampling strategy to determine an off-site release. The best sampling approach would have been to position samplers in the middle of the exposed area, the perimeter of the exposed area, and distance stratified locations (also allowing for wind degree variability) to the property boundary and off-site.

CONCLUSION

Based upon the information presented in these reports, there is no demonstrable release presently occurring at the Richardson Flats site. The vegetative cover placed there by the PRP has reduced the previously documented (1986 FIT report) particulate migration from the site. Any uncapped area will present a potential for particulate migration; and therefore, it should be recommended, if it has not already occurred, that the PRP should complete its vegetating process at Richardson Flats thereby diminishing any potential for particulate migration off-site.

TABLE 1. AIR SAMPLING RESULTS

RICHARDSON FLATS
PARK CITY, UTAH
JUNE 10 - 11, 1992

| Sample Location | Volume of Air Sampled (Liters) | Zinc Data (mg/m ³) ¹ | Arsenic Data (mg/m ³) | Date Sampled | Sample Number |
|-----------------------|--------------------------------|---------------------------------------------|-----------------------------------|-----------------|---------------|
| #1, County Road East | 4816 | .0001 | ND ² | June 10 | 10251 |
| #3, Highway 40 | 4862 | .0001 | ND | June 10 | 10252 |
| #4, NW Corner of Site | 5182 | .0001 | ND | June 11 | 10269 |
| #5, Highway 248 | 5121 | .0001 | ND | June 11 | 10271 |
| Trip Blank | 0 | ND | .01 | NA ³ | 10274 |
| Lot Blank #2 | 0 | ND | .01 | NA | 10261 |

¹ mg/m³.

milligrams per cubic meter.

² ND - Not detected at the instrument limit of quantitation.³ NA - Not applicable, lot and trip blanks apply to the entire sampling effort.

Table 1.1
 Results of the Analysis for Arsenic, Zinc, Cadmium, and Lead, in Air
 Richardson Flats, WA # 3- 642

| Sample ID | Sampling Location | Air Volume (liters) | Conc. Arsenic (mg/m³) | LOQ Arsenic (mg/m³) | Conc. Zinc (mg/m³) | LOQ Zinc (mg/m³) | Conc. Cadmium (mg/m³) | LOQ Cadmium (mg/m³) | Conc. Lead (mg/m³) | LOQ Lead (mg/m³) |
|-----------|--------------------|---------------------|-----------------------|---------------------|--------------------|------------------|-----------------------|---------------------|--------------------|------------------|
| 10251 A | #1, Country Rd. E | 4816 | ND | 0.0021 | 0.0001 | 0.0001 | ND | 0.0001 | ND | 0.0015 |
| 10253 A | #2, Country Rd. N | 4663 | ND | 0.0021 | ND | 0.0001 | ND | 0.0001 | ND | 0.0015 |
| 10252 A | #3, Highway 40 | 4862 | ND | 0.0021 | 0.0001 | 0.0001 | ND | 0.0001 | ND | 0.0014 |
| 10257 A | #4, NW Corner Site | 4990 | ND | 0.0020 | ND | 0.0001 | ND | 0.0001 | ND | 0.0014 |
| 10259 A | #5, Highway 248 | 5121 | ND | 0.0020 | ND | 0.0001 | ND | 0.0001 | ND | 0.0014 |
| 10261 A | Lot Blank 1* | - | ND | 0.01 | ND | 0.0005 | ND | 0.0005 | ND | 0.007 |
| 10267 A | #3, High 40 | 6331 | ND | 0.0016 | ND | 0.0001 | ND | 0.0001 | ND | 0.0011 |
| 10269 A | #4, NW Site | 5182 | ND | 0.0019 | 0.0001 | 0.0001 | ND | 0.0001 | ND | 0.0014 |
| 10263 A | #1, Cou Rd. E | 4587 | ND | 0.0022 | ND | 0.0001 | ND | 0.0001 | ND | 0.0015 |
| 10265 A | #2, Cou Rd. N | 4155 | ND | 0.0024 | ND | 0.0001 | ND | 0.0001 | ND | 0.0017 |
| 10271 A | #5, Highway 248 | 5121 | ND | 0.0020 | 0.0001 | 0.0001 | ND | 0.0001 | ND | 0.0014 |
| 10274 | Trip Blank * | - | 0.01 | 0.01 | ND | 0.0005 | ND | 0.0005 | ND | 0.007 |
| 10275 | Field Blank * | - | ND | 0.01 | ND | 0.0005 | ND | 0.0005 | ND | 0.007 |
| 10261 A | Lot Blank 2* | - | 0.01 | 0.01 | ND | 0.0005 | ND | 0.0005 | ND | 0.007 |
| 10261 A | Lot Blank 3* | - | ND | 0.01 | ND | 0.0005 | ND | 0.0005 | ND | 0.007 |
| 10261 A | Lot Blank 4* | - | ND | 0.01 | ND | 0.0005 | ND | 0.0005 | ND | 0.007 |
| 10261 A | Lot Blank 5* | - | ND | 0.01 | ND | 0.0005 | ND | 0.0005 | ND | 0.007 |

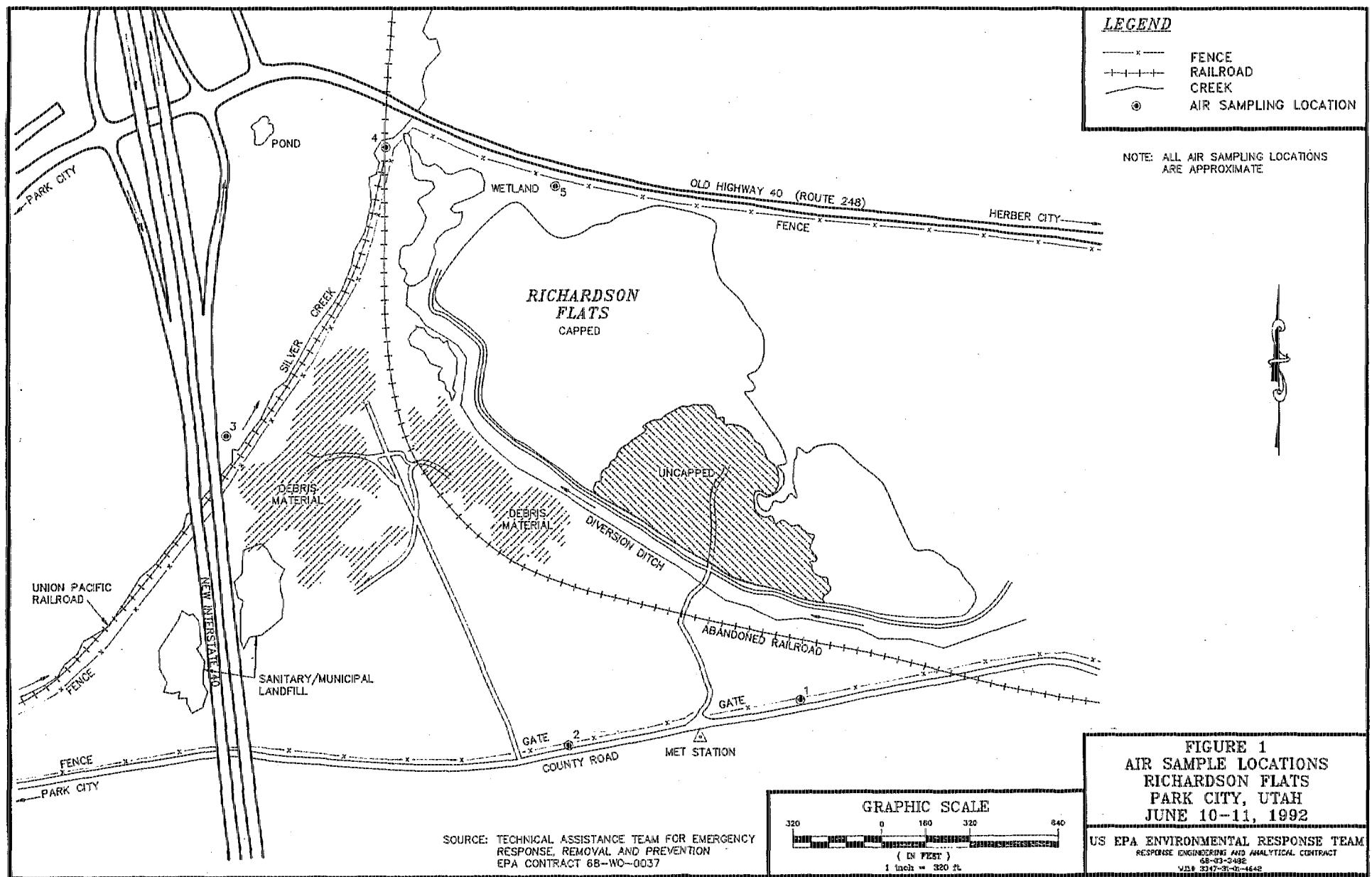
ND denotes not detected

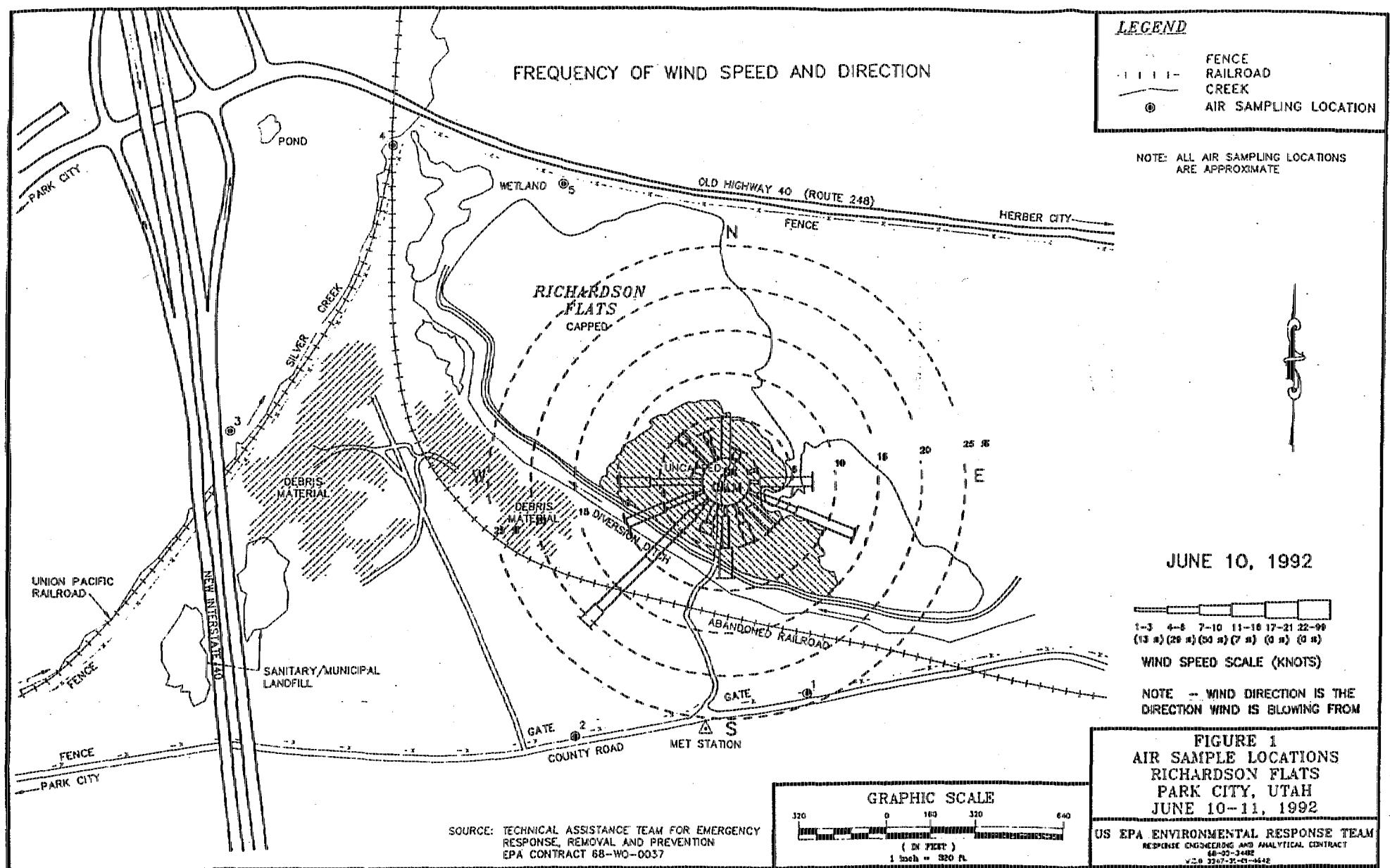
LOQ denotes Limit of Quantitation

* denotes that units for these values are milligrams (mg)

00003

Figures





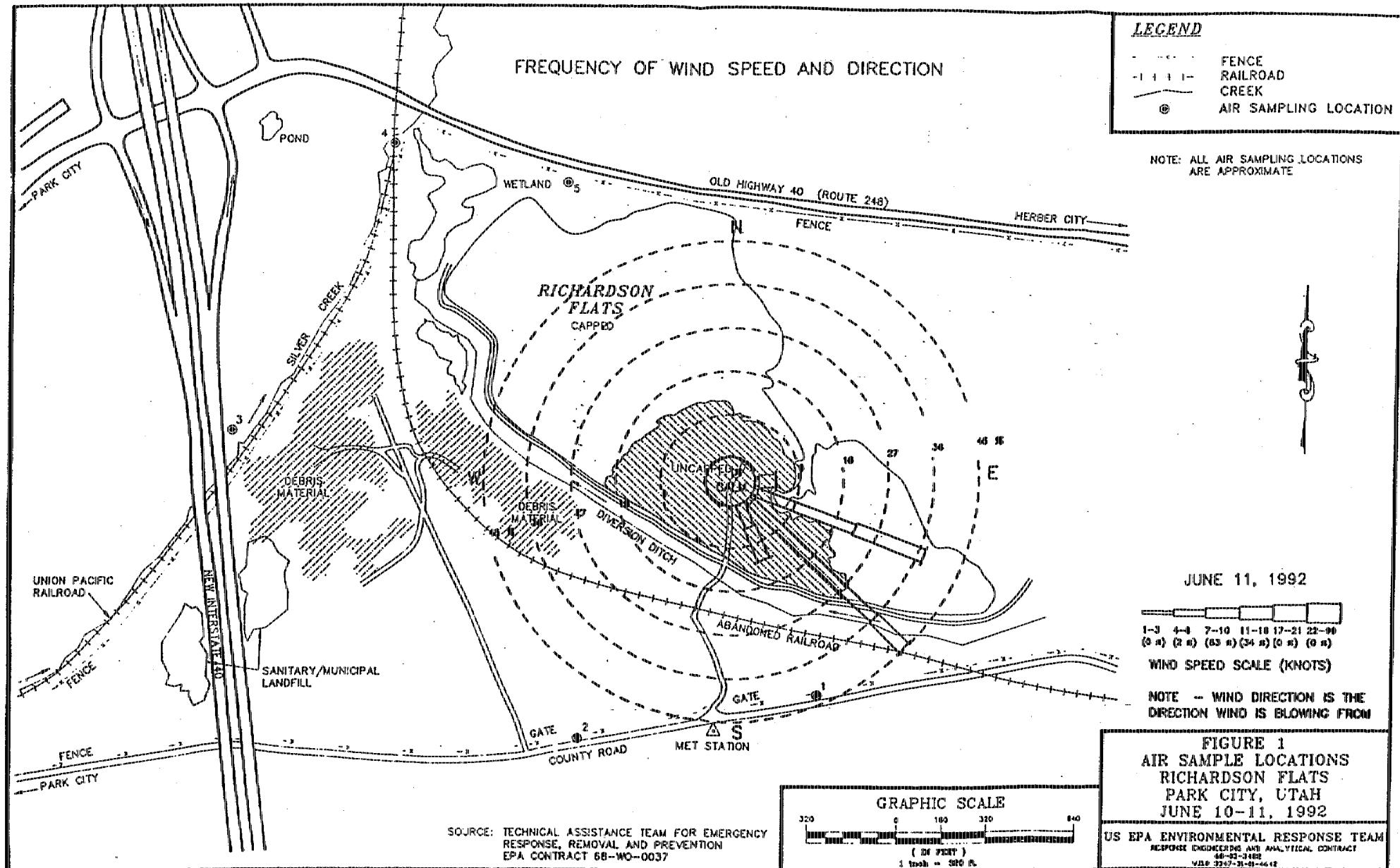
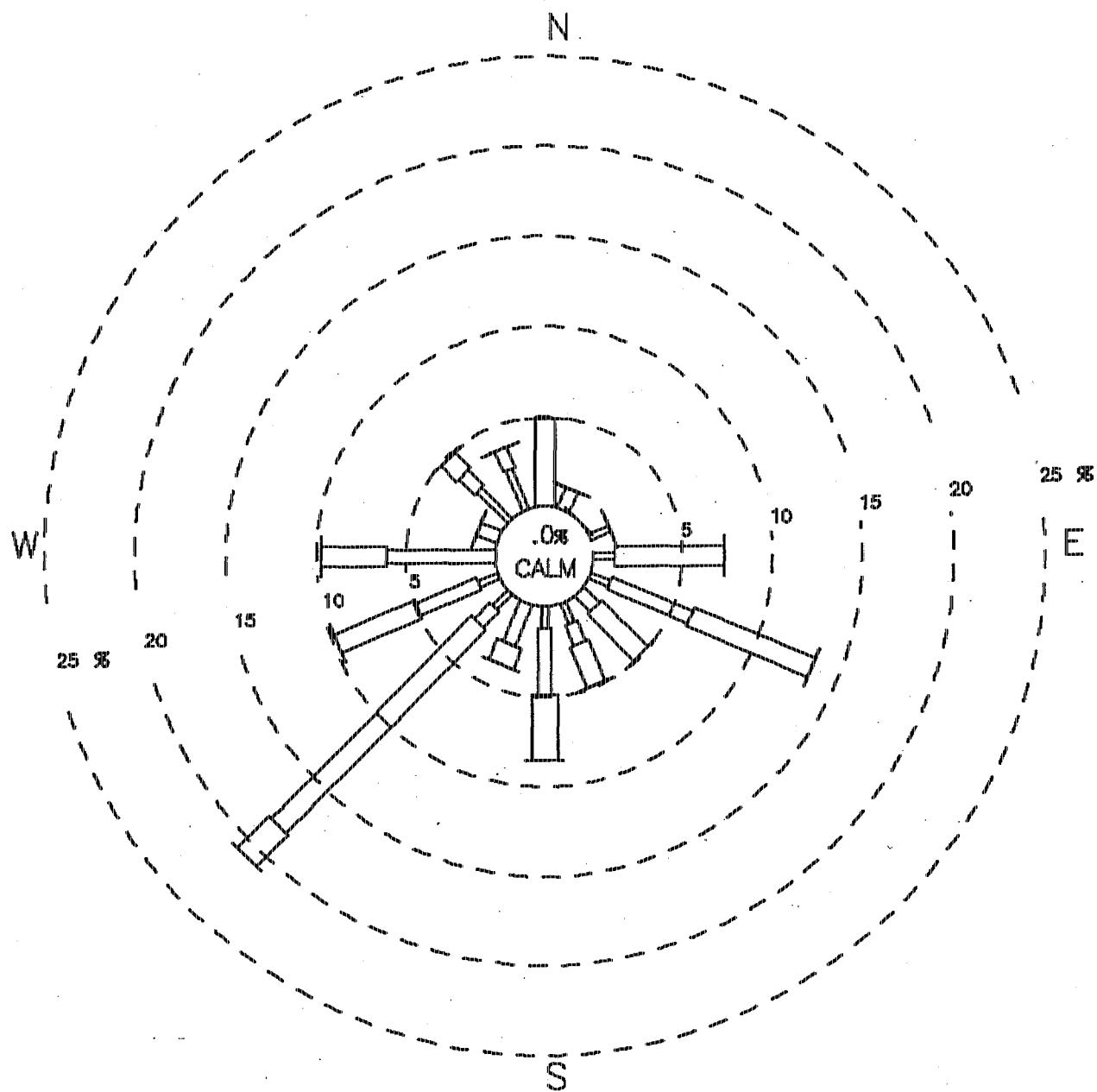


FIGURE 2 FREQUENCY OF WIND SPEED AND DIRECTION



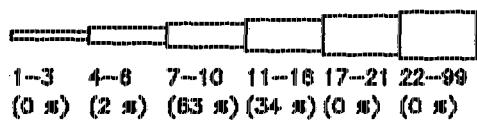
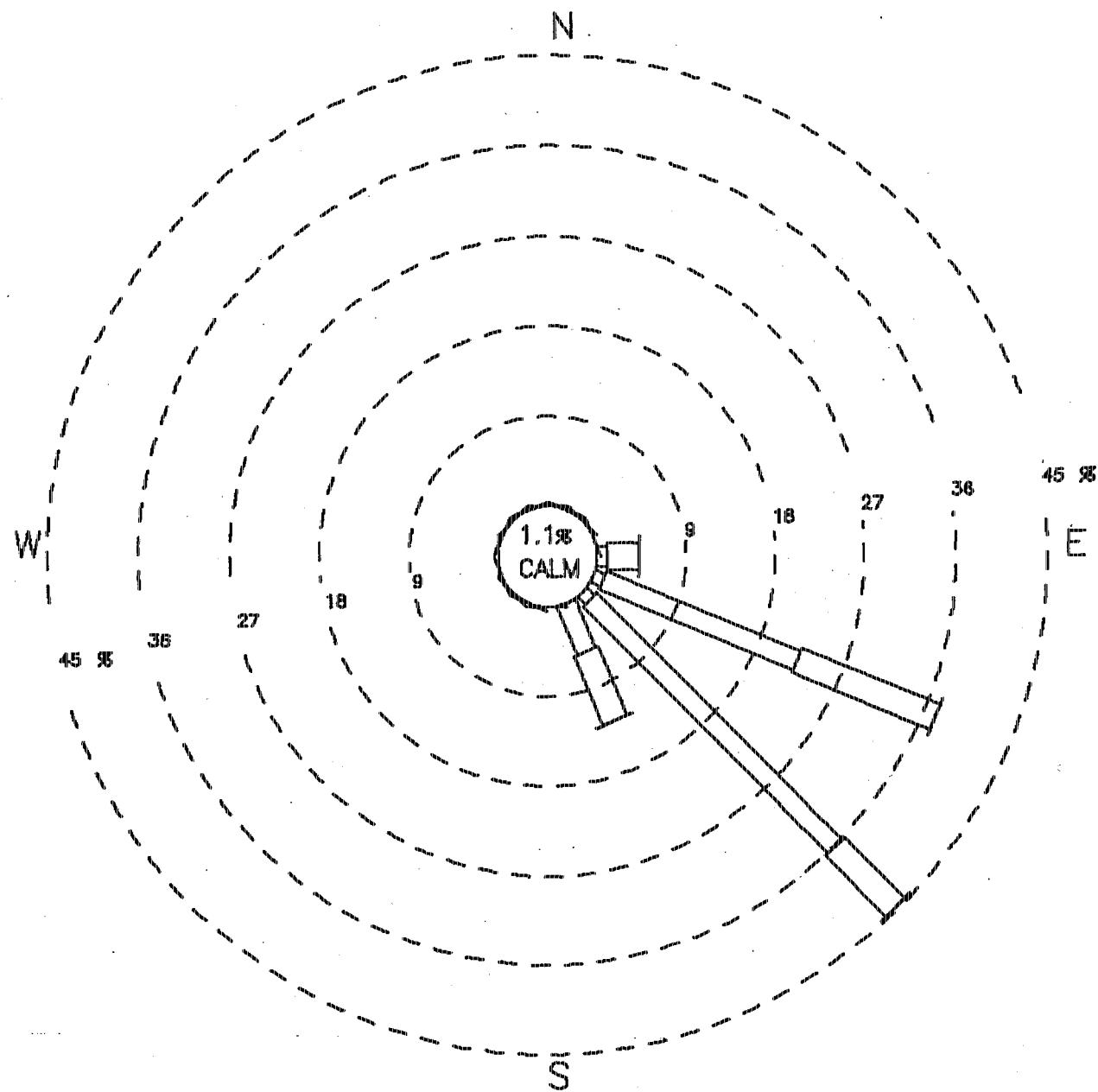
—
1-3 4-6 7-10 11-16 17-21 22-99
(13 n) (29 n) (50 n) (7 n) (0 n) (0 n)

WIND SPEED SCALE (KNOTS)

NOTE - WIND DIRECTION IS THE
DIRECTION WIND IS BLOWING FROM

RICHARDSON FLATS
PARK CITY, UTAH
JUNE 10, 1992
U.S. EPA/ERT & REAC
CONTRACT # 68-03-3482
WA# 3347-31-01-4642

FIGURE 3 FREQUENCY OF WIND SPEED AND DIRECTION



WIND SPEED SCALE (KNOTS)

NOTE - WIND DIRECTION IS THE
DIRECTION WIND IS BLOWING FROM

RICHARDSON FLATS
PARK CITY, UTAH
JUNE 11, 1992
U.S. EPA/ERT & REAC
CONTRACT # 68-03-3482
WA# 3347-31-01-4642

Appendix A

AIR SAMPLING AND ANALYSIS
FINAL REPORT
RICHARDSON FLATS
PARK CITY, UTAH

AUGUST 1992

EPA Work Assignment No.: 3-642
Weston Work Order No.: 3347-31-01-4642
EPA Contract No.: 68-03-3482

Prepared by:

Roy F. Weston, Inc.

Prepared for:

U.S. EPA/ERT

Theresa A.N. Bourbon

Theresa A.N. Bourbon
Task Leader

8/21/92

(Date)

Sella Burchette
Work Assignment Manager


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Project Manager

8/21/92

(Date)

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1.0 INTRODUCTION

1.1 Project Objectives

On June 8, 1992, the Response Engineering and Analytical Contract (REAC) received Work Assignment (WA) #3-642 from the U.S. EPA/ERT. The WA requested that air sampling be performed to determine the existance and extent of airborne contamination migrating from the Richardson Flats site. The U.S. EPA/ERT-REAC field activities took place in June of 1992.

1.2 Site Background

The Richardson Flats site is located approximately 3.5 miles north of Park City, Utah. It is a silver mine tailings disposal site, located on 160 acres, that has been partially covered with soil by the owners. The United States Environmental Protection Agency (U.S. EPA) Region VIII On-Scene Coordinator (OSC), Michael Zimmerman, contacted the U.S. EPA/Environmental Response Team (U.S. EPA/ERT) in Edison, NJ, for assistance with this investigation.

The site has been inactive since the early 1980s. The types of materials handled by the site were heavy metals in tailings and municipal/sanitary refuse. The volume of contaminated materials to be addressed is two million tons of tailings and an unknown quantity of municipal/sanitary refuse. The contaminants of concern are lead, cadmium, arsenic, and zinc. A site map has been adapted from the Richardson Flat Tailings Workplan, provided by the Ecology & the Environment (E&E) Technical Assistance Team (TAT) (Figure 1, Air Sample Locations).

2.0 METHODOLOGY

The U.S. EPA/ERT-REAC field team completed a site walk-through on June 9, 1992. Sampling began on June 10, 1992, and continued through June 11, 1992. Since site accesss was denied, air samples were collected at five locations along the perimeter of the site. The winds were light to heavy (0 - 16 knots) and variable in direction (Figures 2, 3 - Frequency of Wind Speed and Direction, June 10 and 11) over the two sampling days. The sampling locations were chosen on the first day of sampling, apparently in designated upwind and downwind positions. Since the winds changed so much during the day, the locations remained the same for both days, while the upwind and downwind designations changed every day.

2.1 Sampling Activities

Five sampling locations had been chosen by the Region VIII EPA personnel and used for previous sampling efforts. The REAC team did not sample at these same locations since site access was denied. However, five locations along the perimeter were chosen by the U.S. EPA/ERT Work Assignment Manager, based upon the wind direction, to determine if there were any off-site air emissions from the pile. All of the samples collected by the U.S. EPA/ERT and REAC team were collected as replicates. Each sampling location had two pumps set out and two samples collected. One of the samples from each location were provided to the potentially responsible party (PRP), United Park City Mines (UPCM) personnel as "splits". This procedure allows the PRP to have the samples independently analyzed, in the event that they want to perform their own analysis.

Medium flow sampling pumps were used at a flow rate of 10 liters per minute (L/min) for a duration of approximately eight hours per day. Samples were collected from the five sampling locations for two days. Calibrations of the sampling pumps were conducted prior to the sampling effort by means of a primary flow standard (bubble meter), and at the beginning and end of each sampling period using a calibrated secondary flow standard (rotameter). The actual flow rates and sampling periods employed can be referenced in the field data sheets in Appendix A.

On the first day of sampling (June 10, 1992) there were scattered showers; however, the pumps were stopped and the sampling media covered. The showers did not impact the sampling effort. On the second day of sampling (June 11, 1992) there was a brief downpour in the afternoon, at approximately 2:30 pm. The pumps at locations 4 and 5 were not covered quickly enough, and the sampling media became wet. These sample cassettes were exchanged for new sampling media (cassettes) for the remainder of the sampling period on that day. The two samples from locations 4 and 5 were submitted to the laboratory as one sample per location with a total volume for each set of samples. It was requested that the pairs of samples be analyzed as one sample for each location.

A meteorological station was deployed on site to measure and document weather conditions during the sampling effort (Figures 1, Air Sample Locations). The wind direction data collected on site documents where the wind was coming from, as is the standard practice when wind direction data is reported, as opposed to where the wind was going towards (Figures 2, 3). In this way, the sampling locations opposite of the reported wind direction are the locations that would most likely be impacted by airborne contaminants migrating off site (e.g. if the wind was coming from the southwest, a sample collected in the northeast area of the site would be most likely to be contaminated by airborne concentrations of contaminants).

2.2 Standard Operating Procedures (SOPs)

The following U.S. EPA/ERT-REAC SOPs were followed for this project:

- ERT/REAC SOP #2002, Sample Documentation
- ERT/REAC SOP #4010, Chain of Custody
- ERT/REAC SOP #2004, Sample Packaging and Shipment
- ERT/REAC SOP #2003, Sample Storage, Preservation, and Handling
- ERT/REAC SOP #2001, General Field Sampling Guidelines
- ERT/REAC SOP #2005, Quality Assurance/Quality Control Samples
- ERT/REAC SOP #2063, Air Sampling For Metals (NIOSH 7300 Elements)
- REAC SOP # 2062, Rotameter Calibration
- REAC SOP # 2060, RAM - 1 Operation

3.0 RESULTS

The raw analytical data, analytical methods used, and specific analytical information can be referenced in Appendix B, REAC Final Analytical Report.

3.1 June 10, 1992

The results for the samples collected at locations 2, 4, and 5 were non-detect for all the parameters tested (arsenic, zinc, cadmium, and lead). The results for the samples collected from locations 1 and 3 were non-detect for all the parameters except zinc. The concentration detected for zinc in both cases was .0001 milligrams per cubic meter (mg/m^3), which is also the

analytical quantitation limit. The analytical data is presented in Table 1.

3.2 June 11, 1992

The results for the samples collected at locations 1, 2, and 3 were non-detect for all the parameters tested. The results for the samples collected from locations 4 and 5 were non-detect for all the parameters except zinc. The concentration detected for zinc in both cases was .0001 mg/m³, which is also the analytical quantitation limit. The analytical data is presented in Table 1.

4.0 DISCUSSION OF RESULTS

In two of the blanks (trip blank and lot blank #2), there were quantifiable concentrations of arsenic found. These concentrations were .01 mg/m³, which is also the analytical quantitation limit. Since the arsenic values for all the samples were not detected at the analytical quantitation limit (ND), these values do not affect the sample results (Table 1). It is possible that these concentrations represent laboratory contamination.

4.1 June 10, 1992

The concentrations of zinc detected in the samples from locations 1 and 3 are low (quantitation limit), and there were no parameters detected at the other three locations. The winds were very variable (Figure 2) but primarily came from the southwest. Sampling location 3 was in the path of the wind, and considering that the site was surrounded by mountains, sampling location 1 could also have been in the path of the wind (See Figure 1) due to possible wind channelling effects.

4.2 June 11, 1992

The concentrations of zinc detected in the samples from locations 4 and 5 are low (quantitation limit), and there were no parameters detected at the other three locations. These two samples are also the same samples that had gotten wet in the rainshower, and the filter cassettes were changed in the middle of the sampling period. Both filters collected from each of these locations were analyzed as one sample per location and the results calculated for a total volume. The winds were variable (Figure 3) but were primarily coming from the southeast. Sampling locations 4 and 5 were in the northwest areas of the site, which is supported by the wind data that was collected on site.

REFERENCES

Ecology & the Environment (E&E) Technical Assistance Team (TAT), "Richardson Flat Tailings Sampling QA/QC Workplan", Work Order # EUT0039SBA, June 1992.

Ecology & the Environment (E&E) Field Investigation Team (FIT), "Revised Analytical Results Report of Air Sampling at Richardson Flat Tailings", TDD# R8-8608-05, September 1987.

TABLE 1. AIR SAMPLING RESULTS

RICHARDSON FLATS
 PARK CITY, UTAH
 JUNE 10 - 11, 1992

| Sample Location | Volume of Air Sampled (Liters) | Zinc Data (mg/m ³) ¹ | Arsenic Data (mg/m ³) | Date Sampled | Sample Number |
|-----------------------|--------------------------------|---------------------------------------------|-----------------------------------|-----------------|---------------|
| #1, County Road East | 4816 | .0001 | ND ² | June 10 | 10251 |
| #3, Highway 40 | 4862 | .0001 | ND | June 10 | 10252 |
| #4, NW Corner of Site | 5182 | .0001 | ND | June 11 | 10269 |
| #5, Highway 248 | 5121 | .0001 | ND | June 11 | 10271 |
| Trip Blank | 0 | ND | .01 | NA ³ | 10274 |
| Lot Blank #2 | 0 | ND | .01 | NA | 10261 |

¹ mg/m³ - milligrams per cubic meter.

² ND - Not detected at the instrument limit of quantitation.

³ NA - Not applicable, lot and trip blanks apply to the entire sampling effort.

APPENDIX A
Field Sampling Data Sheets

Richardson Flats
Final Report
August 1992

APPENDIX A
Field Sampling Data Sheets

Richardson Flats
Final Report
August 1992

ENVIRONMENTAL RESPONSE TEAM
AIR SAMPLING WORKSHEETRoy F. Weston, Inc.
REAC Project, Edison, NJ
EPA Contract No. 68-03-3482SITE Richardson Flats
SAMPLERS TNB, JP, EB
DATE 6/11/92W.A. # 3347-31-01-4642
EPA WAM Burchette
REAC TL Bourbon

SAMPLE NO.

10271 A 10271 B

| | | | | | | |
|-------------------------|----------------------|-------------------|-----|-----|-----|--|
| Sample Location | 5 | 5 | | | | |
| Remarks | Highway 248-Ridge | UPCM | | | | |
| Pump No. | 2238 | 1508 | | | | |
| Collection Media | .8u MCEF NIOSH | .8u MCEF NIOSH | | | | |
| Analysts Requested | 7300 | 7300 | | | | |
| Time of Day | 8:06am | 8:06am | | | | |
| Time/Counter (Start) | 06175.8 | 10533.2 | | | | |
| Time/Counter (Stop) | 06656.7 | 11012.6 | | | | |
| Total Sampling Time | 480.9 m | 479.4 m | | | | |
| Pump Fault | Y/N | Y/N | Y/N | Y/N | Y/N | |
| Flow Rate (Start) | 10.0 l/m | 10.0 l/m | | | | |
| Flow Rate (Stop) | 10.0 l/m | 10.0 l/m | | | | |
| Flow Rate (Average) | 10.0 l/m | 10.0 l/m | | | | |
| Volume Sampled | 4,809 L | 4,794 L | | | | |

Air Monitoring Data

HNU

OVA

>EE/RUN#-(
TNB

set w/ data logger

N/A

#652399 Ram #4

WEATHER PARAMETERS

Weather Conditions

Wind direction

met stat. on site
Temperature
Pressure

Humidity

Windspeed

Net ID

298 - upack

GENERAL COMMENTS:

Cloudy / sunny

* UPCM Samples = "Splits" for PRP
rd/BATZ/WORKSHEET

ENVIRONMENTAL RESPONSE TEAM
AIR SAMPLING WORKSHEETRoy F. Weston, Inc.
REAC Project, Edison, NJ
EPA Contract No. 68-03-3482

SITE Richardson flats
SAMPLERS TNB JP SB
DATE 6/10/92

W.A. # 3347-31-01-4642
EPA WAM Burchette
REAC TL Bourbon

SAMPLE NO. 10251A 10251B 10253A 10253B 10274

| Sample Location | 1 | 1 | 2 | 2 | Trip Blank |
|----------------------|--------------------------|-------------------------|------------------------|------------|------------|
| Remarks | Upwind - County Rd. East | Juniper Park City Annex | Set. gather County Rd. | Upwind * | N/A |
| Pump No. | 22445 | 1505 | 22440 | 2248 | N/A |
| Collection Media | MCEF | MCEF | MCEF | MCEF | MCEF |
| Analysts Requested | NIOSH 7300 | NIOSH 7300 | NIOSH 7300 | NIOSH 7300 | NIOSH 7300 |
| Time of Day | 10:50am | 10:50am | 10:36am | 10:36am | N/A |
| Time/Counter (Start) | 02446.5 | 11238.4 | 11146.9 | 09795.7 | N/A |
| Time/Counter (Stop) | 03128.1 | Time from 2245 | 11613.2 | 10216.1 | N/A |
| Total Sampling Time | 481.6 m | 481.6 m | 466.3 m | 466.4 m | N/A |
| Pump Fault | Y/N | Y/N | Y/N | Y/N | Y/N |
| Flow Rate (Start) | 10.0 l/m | 10.0 l/m | 10.0 l/m | 10.0 l/m | N/A |
| Flow Rate (Stop) | 10.0 l/m | 10.0 l/m | 10.0 l/m | 10.0 l/m | |
| Flow Rate (Average) | 10.0 l/m | 10.0 l/m | 10.0 l/m | 10.0 l/m | |
| Volume Sampled | 4816.0 | 4816.0 | 4663.8 | 4664.0 | 0.0 |
| Air Monitoring Data | N/A | | | | → |
| HNU | | | | | |
| OVA | | | | | |
| LEL/RAM | | | | | |

WEATHER PARAMETERS

Weather Conditions

met Station fm site

Wind direction

Temperature

Windspeed

Pressure

Humidity

Met ID 290

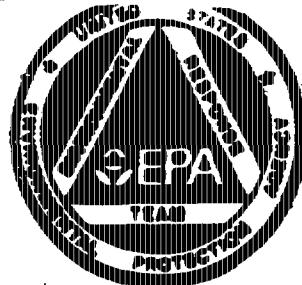
GENERAL COMMENTS:

Sunny, some clouds, occ. showers (no heavy rain)

rd/BATZ/WORKSHEET

- UPCim-(PRP): we will be giving them one cassette from each location as "solids"

k
ited Park
ity mines



ENVIRONMENTAL RESPONSE TEAM
AIR SAMPLING WORKSHEET

Roy F. Weston, Inc.
REAC Project, Edison, NJ
EPA Contract No. 68-03-3482

SITE Richardson Flats W.A. # 3342-31-01-4642
SAMPLERS TWA, JP, SB EPA HAN Burquette
DATE June 10, 1992 REAC TL Bourbon

SAMPLE NO. 10252A 10252B 10257A 10257B

| | | | | |
|----------------------|-------------------|-------------------|----------------------------------------------|-------------------|
| Sample Location | <u>3</u> | <u>3</u> | <u>4</u> | <u>4</u> |
| Remarks | <u>Highway 40</u> | <u>UPCM*</u> | <u>NW corner of site - Nealold RL Treate</u> | <u>UPCM*</u> |
| Pump No. | <u>1504</u> | <u>2242</u> | <u>1508</u> | <u>2238</u> |
| Collection Media | <u>MCEF</u> | <u>MCEF</u> | <u>MCEF</u> | <u>MCEF</u> |
| Analysis Requested | <u>NIOSH 7300</u> | <u>NIOSH 7300</u> | <u>NIOSH 7300</u> | <u>NIOSH 7300</u> |
| Time of Day | <u>05713.8</u> | <u>07911.0</u> | <u>10833.9</u> | <u>05676.7</u> |
| Time/Counter (Start) | <u>9:54 am</u> | <u>9:54 am</u> | <u>10:09 am</u> | <u>10:09 am</u> |
| Time/Counter (Stop) | <u>06100.0</u> | <u>08397.0</u> | <u>10532.9</u> | <u>06175.5</u> |
| Total Sampling Time | <u>486.2 m</u> | <u>486.0 m</u> | <u>499 m</u> | <u>498.8 m</u> |
| Pump Fault | <u>Y/N</u> | <u>Y/N</u> | <u>Y/N</u> | <u>Y/N</u> |
| Flow Rate (Start) | <u>10.2 l/m</u> | <u>10.2 l/m</u> | <u>10.2 l/m</u> | <u>10.2 l/m</u> |
| Flow Rate (Stop) | <u>10.2 l/m</u> | <u>10.2 l/m</u> | <u>10.2 l/m</u> | <u>10.2 l/m</u> |
| Flow Rate (Average) | <u>10.2 l/m</u> | <u>10.2 l/m</u> | <u>10.2 l/m</u> | <u>10.2 l/m</u> |
| Volume Sampled | <u>4,862 l</u> | <u>4,810 l</u> | <u>4,990 l</u> | <u>4,988 l</u> |

Air Monitoring Data
HNU
OVA
LEL/RAM

WEATHER PARAMETERS

Weather Conditions Partly cloudy on site Temperature 72° F Windspeed 0 mph
Wind direction SW Pressure 30.05 in Hg Humidity 55% Met ID 208 w. oak

GENERAL COMMENTS: Sunny, Some clouds, occ. showers - no heavy rain

*UPCM - "Split" samples for PRP
rd/BATZ/WORKSHEET

ENVIRONMENTAL RESPONSE TEAM
AIR SAMPLING WORKSHEETRoy F. Weston, Inc.
REAC Project, Edison, NJ
EPA Contract No. 68-03-3482

SITE Rickardon Flats W.A. # 3347-31-01-4642
SAMPLERS TB, JP, SB EPA WAM Burchette
DATE 6/11/92 REAC TL Bourbon

SAMPLE NO. 10263A 10263B 10265A 10265B

| Sample Location | 1 | 1 | 2 | 2 |
|----------------------|-------------------------------|----------------|----------------|----------------|
| Remarks | County Rd. E <u>TSRSTB</u> | UPCM | County Rd. W | UPCM |
| Pump No. | <u>1505</u> | <u>2245</u> | <u>2247</u> | <u>2234</u> |
| Collection Media | .8m MCEF | .8m MCEF | .8m MCEF | .8m MCEF |
| Analysis Requested | NIOSH 7303 | 7300 | NIOSH 7303 | 7300 |
| Time of Day | 8:37am | 8:37am | 8:25am | 8:25 am |
| Time/Counter (Start) | <u>11238.4</u> | <u>03128.1</u> | <u>05544.0</u> | <u>11761.5</u> |
| Time/Counter (Stop) | <u>Time not</u> | <u>03586.8</u> | <u>06259.5</u> | <u>12177.0</u> |
| Total Sampling Time | <u>458.7m</u> | <u>458.7m</u> | <u>415.5 m</u> | <u>415.5 m</u> |
| Pump Fault | <u>Y/D</u> | <u>Y/D</u> | <u>Y/D</u> | <u>Y/N</u> |
| Flow Rate (Start) | <u>10cfm</u> | <u>10cfm</u> | <u>10cfm</u> | <u>10cfm</u> |
| Flow Rate (Stop) | <u>10cfm</u> | <u>10cfm</u> | <u>10cfm</u> | <u>10cfm</u> |
| Flow Rate (Average) | <u>10cfm</u> | <u>10cfm</u> | <u>10cfm</u> | <u>10cfm</u> |
| Volume Sampled | <u>4,587 l</u> | <u>4,587 l</u> | <u>4,155 l</u> | <u>4,155 l</u> |

Air Monitoring Data

| | | | | |
|----------|-----------------------------|----------|------------|----------|
| HNU | <u>—</u> | <u>—</u> | <u>N/A</u> | <u>—</u> |
| OVA | <u>—</u> | <u>—</u> | <u>—</u> | <u>—</u> |
| ERTRAM-1 | <u>set out w/data/param</u> | <u>—</u> | <u>—</u> | <u>—</u> |
| TMB | <u>—</u> | <u>—</u> | <u>—</u> | <u>—</u> |

Run REAC-7 datalogger
param 5
Mot ID 298

WEATHER PARAMETERS
Weather Conditions met. site, on-site
Wind direction — Temperature —
Wind speed — Pressure —
Humidity — Mot ID 298

GENERAL COMMENTS: overcast, sunny

* UPCM samples = "Splits" for PRP
rd/BATZ/WORKSHEET

ENVIRONMENTAL RESPONSE TEAM
AIR SAMPLING WORKSHEETRoy F. Weston, Inc.
REAC Project, Edison, NJ
EPA Contract No. 68-03-3482

SITE Richardson Flats
SAMPLERS TUB, JP, SB
DATE 6/11/92

W.A. # 3347-31-01-4642
EPA WAM Porchette
REAC TL Bourbon

SAMPLE NO. 10267A 10267B 10269A 10269B

| Sample Location | 3 | 3 | 4 | 4 |
|-------------------------|--------------------------------------|---------------------------|---------------------------|---------------------------|
| Remarks | Highway 40 | UPCM * | NW corner | UPCM * |
| Pump No. | 22410 1504 | 28418 TUB | 22411 | 2243 |
| Collection Media | .8m MCEF NIOSH 1300 | .8m MCEF NIOSH 7300 | .8m MCEF NIOSH 7300 | .8m MCEF NIOSH 7300 |
| Analysis Requested | | | | |
| Time of Day | 7:50 am | 7:50 am | 8 am | 8 am |
| Time/Counter (Start) | 11613.2 | 06397.0 | 06200.0 | 10262.1 |
| Time/Counter (Stop) | 12104.9 | 18888.7 | 06718.2 | 10780.9 |
| Total Sampling Time | 491.7 m | 491.7 m | 518.2 m | 518.8 m |
| Pump Fault | Y/N | Y/N | Y/N | Y/N |
| Flow Rate (Start) | 10.2 l/m OR - rotameter at 6.3 | 10.2 l/m | 10.2 l/m | 10.2 l/m |
| Flow Rate (Stop) | 15.75 l/m | 10.2 l/m | 10.2 l/m | 11.2 l/m |
| Flow Rate (Average) | 12.88 l/m TUB | 10.2 l/m | 10.2 l/m | 13.2 l/m |
| Volume Sampled | 6331.8 | 4917.8 | 5,182.8 | 6,744.8 |

Air Monitoring Data →
HNU
OVA
LEL/RAM
TUB

WEATHER PARAMETERS

Weather Conditions met Stn. on site
Wind direction Pressure Temperature
Wind speed Humidity Net ID 298-w, pak

GENERAL COMMENTS: Cloudy / sunny

* VPCM samples - "Splits" for PRP
rd/BATZ/WORKSHEET

Appendix B

APPENDIX B
REAC Final Analytical Report

**Richardson Flats
Final Report
August 1992**



REAC SUPPORT ORGANIZATION
GSA RARITAN DEPOT
2890 WOODBRIDGE AVENUE
BLDG. 209 ANNEX
EDISON, NJ 08837-3679
908-632-9200 • FAX: 908-632-9205

DATE: July 17, 1992

TO: R. Singhvi EPA/ERT
FROM: V. Kansal S&A Section Chief *VKB*

SUBJECT: DOCUMENT TRANSMITTAL UNDER WORK ASSIGNMENT # 3-642

Attached please find the following document prepared under this work assignment:

Richardson Flats

Central File WA# 3-642 (w/attachment)
W.S. Butterfield
S. Burchette
T. Bourbon
M. Barkley

ANALYTICAL REPORT

Prepared by
Roy F. Weston, Inc.

Richardson Flats
Park City, UT

July 17, 1992

EPA Work Assignment No. 3-642
Project No. 3347-31-01-4642
EPA Contract No. 68-03-3482

Submitted to
S. Burchette
EPA-ERT

Theresa A. N. Bourbon 7/16/92

T. Bourbon Date
Task Leader

Analysis by:
AETNA/AXIA

Vinod Kansal 7/17/92

V. Kansal Date
S. & A. Section Chief

Prepared by:
J. Hunter

W. S. Butterfield 7/17/92

W. S. Butterfield Date
Project Manager

Reviewed by:
M. Barkley

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| Appendix will be furnished on request. | |

INTRODUCTION

REAC Laboratory, in response to ERT work assignment # 3-642, provided analytical services for samples collected from the Richardson Flats site, located in Park City, Utah, on June 10, 1992 and June 11, 1992. These services involved the sub-contracting of the analysis of air samples for arsenic, zinc, cadmium, and lead; the performance of a QA/QC data validation review; and the production of an analytical report summarizing the results.

| Number of Samples | Matrix | Analysis | Laboratory |
|-------------------|--------|------------------|------------|
| 17 | Air | As, Zn, Cd, & Pb | AETNA/AXIA |

CASE NARRATIVE

There are no qualifications to the data. However the following items should be noted;

- 1) The results for zinc, lead and chromium were less than the quantitation limit for all the blanks. Consequently, blank subtraction was not performed. Three of the five blanks had positive results for arsenic at the detection limit. However, all the sample results for arsenic were non-detects. Therefore blank subtraction was not performed on the arsenic analyses.
- 2) The ICP instrument detection limits were based upon a study performed by the subcontracting laboratory.
- 3) One of the blank spike percent recovery values (arsenic: 111 %) was above the 90% to 110% limits. The data validator did not qualify the data because;
 - a) All the results for arsenic were non-detects.
 - b) The bias was small and on the high side, and consequently should not affect the detection limits.

00001

ANALYTICAL PROCEDURE FOR ARSENIC, ZINC, CADMIUM, AND LEAD IN AIR

The subcontractor followed the procedures set forth in 40 Code of Federal Regulations Part 50 Appendix G to prepare the samples and the procedures set forth in NIOSH Method 7300 to analyze the solutions of the digested samples. The results of the analyses are listed in Table 1.1.

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00003

| Sample ID | Location | Air Conc. | Lead Conc. | Lead LOQ | Cadmium Conc. | Cadmium LOQ | Zinc Conc. | Zinc LOQ | Arsenic Conc. | Arsenic LOQ | Volume (liters) | (mg/m ³) | Lead | Lead LOQ |
|-----------|--------------------|-----------|------------|----------|---------------|-------------|------------|----------|---------------|-------------|-----------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|------|----------|
| 10251 A | #1, Country Rd. E | 4816 | ND | 0.0001 | 0.0001 | ND | 0.0001 | ND | 0.0001 | ND | 0.0015 | 0.0015 | 0.0015 | 0.0015 | 0.0015 | 0.0015 | ND | ND | |
| 10253 A | #2, Country Rd. N | 4663 | ND | 0.0001 | 0.0001 | ND | 0.0001 | ND | 0.0001 | ND | 0.0015 | 0.0015 | 0.0015 | 0.0015 | 0.0015 | 0.0015 | ND | ND | |
| 10257 A | #3, Highway 40 | 4862 | ND | 0.0001 | 0.0001 | ND | 0.0001 | ND | 0.0001 | ND | 0.0014 | 0.0014 | 0.0014 | 0.0014 | 0.0014 | 0.0014 | ND | ND | |
| 10257 A | #4, NW Corner Site | 4990 | ND | 0.0001 | 0.0001 | ND | 0.0001 | ND | 0.0001 | ND | 0.0014 | 0.0014 | 0.0014 | 0.0014 | 0.0014 | 0.0014 | ND | ND | |
| 10259 A | #5, Highway 248 | 5121 | ND | 0.0020 | ND | 0.0005 | ND | 0.0001 | ND | 0.0001 | ND | 0.0014 | 0.0014 | 0.0014 | 0.0014 | 0.0014 | 0.0014 | ND | ND |
| 10261 A | #6, Highway 248 | 5121 | ND | 0.0020 | 0.0001 | ND | 0.0001 | ND | 0.0001 | ND | 0.0014 | 0.0014 | 0.0014 | 0.0014 | 0.0014 | 0.0014 | ND | ND | |
| 10263 A | #1, Col. 3d, E | 4587 | ND | 0.0022 | ND | 0.0001 | ND | 0.0001 | ND | 0.0001 | ND | 0.0015 | 0.0015 | 0.0015 | 0.0015 | 0.0015 | 0.0015 | ND | ND |
| 10269 A | #4, NM Hwy | 6331 | ND | 0.0016 | ND | 0.0001 | ND | 0.0001 | ND | 0.0001 | ND | 0.0011 | 0.0011 | 0.0011 | 0.0011 | 0.0011 | 0.0011 | ND | ND |
| 10277 A | #5, Hwy 40 | 60 | - | - | ND | 0.0005 | ND | 0.0001 | ND | 0.0001 | ND | 0.0007 | 0.0007 | 0.0007 | 0.0007 | 0.0007 | 0.0007 | ND | ND |
| 10261 A | #6, Blank 1+ | - | 0.01 | 0.01 | ND | 0.0005 | ND | 0.0001 | ND | 0.0001 | ND | 0.0007 | 0.0007 | 0.0007 | 0.0007 | 0.0007 | 0.0007 | ND | ND |
| 10261 A | #6, Blank 2+ | - | 0.01 | 0.01 | ND | 0.0005 | ND | 0.0001 | ND | 0.0001 | ND | 0.0007 | 0.0007 | 0.0007 | 0.0007 | 0.0007 | 0.0007 | ND | ND |
| 10261 A | #6, Blank 3+ | - | 0.01 | 0.01 | ND | 0.0005 | ND | 0.0001 | ND | 0.0001 | ND | 0.0007 | 0.0007 | 0.0007 | 0.0007 | 0.0007 | 0.0007 | ND | ND |
| 10261 A | #6, Blank 4+ | - | 0.01 | 0.01 | ND | 0.0005 | ND | 0.0001 | ND | 0.0001 | ND | 0.0007 | 0.0007 | 0.0007 | 0.0007 | 0.0007 | 0.0007 | ND | ND |
| 10261 A | #6, Blank 5+ | - | 0.01 | 0.01 | ND | 0.0005 | ND | 0.0001 | ND | 0.0001 | ND | 0.0007 | 0.0007 | 0.0007 | 0.0007 | 0.0007 | 0.0007 | ND | ND |

* denotes that values for these samples are milligrams (mg)

LOQ denotes Limit of Quantification

ND denotes not detected

Table 1.1
Results of the Analyses for Arsenic, Zinc, Cadmium, and lead, in Air
Richardson Flats, MA # 3- 662

QA/QC FOR ARSENIC, ZINC, CADMIUM, AND LEAD

Results of Blank Spike Analysis

Two blank spike analyses were performed. The first (QC Spike # 1) had 30 ug of As, Zn, Cd, and Pb added. The percent recoveries for QC Spike # 1 ranged from 101 to 111. The percent recovery for arsenic was outside the QC limits. The percent recoveries for QC Spike # 1 are listed in Table 2.1. The second (QC Spike # 2) had 40 ug of As, Zn, Cd, and Pb added. The percent recoveries for QC Spike # 2 ranged from 101 to 108. The percent recoveries for QC Spike # 2 are listed in Table 2.1.

00004

Table 2.1
Results of the Blank Spike Analysis
Richardson Flats, WA # 3-642

QC Spike # 1

| Analyte | Analyte Mass in Blank (ug) | Mass Spiked (ug) | Blank Spike Analyte Mass (ug) | Blank Spike % Recovery |
|---------|----------------------------|------------------|-------------------------------|------------------------|
| Arsenic | ND | 30 | 33.19 | 111 * |
| Zn | ND | 30 | 30.49 | 102 |
| Cadmium | ND | 30 | 30.37 | 101 |
| Lead | ND | 30 | 30.72 | 102 |

* denotes that this value is outside the recommended limits
The percent recovery limits are from 90% to 110%
ND denotes not detected

QC Spike # 2

| Analyte | Analyte Mass in Blank (ug) | Mass Spiked (ug) | Blank Spike Analyte Mass (ug) | Blank Spike % Recovery |
|---------|----------------------------|------------------|-------------------------------|------------------------|
| Arsenic | ND | 40 | 43.11 | 108 |
| Zinc | ND | 40 | 40.27 | 101 |
| Cadmium | ND | 40 | 40.95 | 101 |
| Lead | ND | 40 | 40.32 | 102 |

The percent recovery limits are from 90% to 110%
ND denotes not detected

00005

Roy F. Weston, Inc.
REAC, Edison, N.J.
EPA Contract 68-03-3482

CHAIN OF CUSTODY / RECORD/LAB WORK REQUEST

Project Name: Richardson Flats, Park City, Utah
Project Number: 3347-31-01-4642
RFW Contact: John Johnson or Phone: 908-632-7200
Debbie Weeks

No: 5844

SHEET NO. 1 OF 1

23966

SAMPLE IDENTIFICATION

CASSETTES

ANALYSES REQUESTED

| REAC # | Sample No. | Sampling Location | Matrix | Date Collected | # of Bottles | Container/ Preservative | Vol. Cell. | NIOSH 7300 | | |
|--------|------------|---------------------|--------|----------------|--------------|----------------------------|------------|------------|--|--|
| JP | 10251 A | #1, County Rd. E | A | 6/10/92 | N/A | .8u MCEF | 4S16 L | *✓* | | |
| | 10253 A | #2, County Rd. N | A | 6/10/92 | N/A | .8u MCEF | 4,663 L | ✓ | | |
| | 10252 A | #3, Highway 40 | A | 6/10/92 | N/A | .8u MCEF | 4,862 L | ✓ | | |
| | 10257 A | #4, NW corner Sik | A | 6/10/92 | N/A | .8u MCEF | 4,790 L | ✓ | | |
| | 10259 A | #5, Highway 248 | A | 6/10/92 | N/A | .8u MCEF | 5,121 L | ✓ | | |
| | 10261 | Lot Blanks -5 cass. | A | 6/10/92 | N/A | .8u MCEF | 0 L | ✓ | | |
| | 10267 A | #3, Highway 40 | A | 6/11/92 | N/A | .8u MCEF | 6331 L | ✓ | | |
| * | 10269 A | #4, NW corner Sik | A | 6/11/92 | 2 | .8u MCEF | 5,182 L | ✓ | | |
| | 10263 A | #1, County Rd. E | A | 6/11/92 | 1 | .8u MCEF | 4,587 L | ✓ | | |
| | 10265 A | #2, County Rd. N | A | 6/11/92 | 1 | .8u MCEF | 4,155 L | ✓ | | |
| * | 10271 A | #5, Highway 248 | A | 6/11/92 | 1 | .8u MCEF | 5,121 L | ✓ | | |
| F | 10274 | Trib Blank | A | 6/11/92 | 1 | .8u MCEF | 0 L | ✓ | | |
| | 10275 | Field Blanks | A | 6/11/92 | 2 | .8u MCEF | 0 L | ✓ | | |

TAB

TAB

* NIOSH 7300 method - only Lead, Arsenic, Cadmium, and Zinc parameters

Matrix:

| | | |
|-------------------|--------------------|-----------|
| SD - Sediment | PW - Potable Water | S - Soil |
| DS - Drum Solids | GW - Groundwater | W - Water |
| DL - Drum Liquids | SW - Surface Water | O - Oil |
| X - Other | SL - Sludge | A - Air |

Special Instructions:

Preliminary results due 7/3/92

Final Analytical report due 8/3/92

* These are 1 sample, analyze both cassettes as 1 sample!

| | | | |
|-----------------------------|--|--|--|
| FOR SUBCONTRACTING USE ONLY | | | |
| FROM CHAIN OF | | | |
| CUSTODY # | | | |

| Items/Reason | Relinquished By | Date | Received By | Date | Time | Items/Reason | Relinquished By | Date | Received By | Date | Time |
|------------------------------|-----------------|---------|-------------|---------|-------|--------------|-----------------|------|-------------|------|------|
| 13/Analysis thru Jh. Bourbon | J. Johnson | 6/11/92 | J. Johnson | 6/11/92 | 14:16 | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |

B# 10257 7.140 N.W. 1/1000 1/1000 1/1000
10253 7.141 N.W. 1/1000 1/1000 1/1000

#10271 - preliminary results due 7/3/92



REAC SUPPORT ORGANIZATION
GSA RARITAN DEPOT
WOODBRIDGE AVENUE
BUILDING 209, BAY F
EDISON, NJ 08837
PHONE: 201-632-9200

Axia Service/AETNA
Dept. W101
151 Farmington Ave
Hartford, CT 06156

Attn: Ethel Patricio
Re: Project # 3347-31-01-4642, Richardson Flats

June 11, 1992

As per Weston REAC Purchase Order number 08-81877, dated 06/11/92, please analyze samples according to the following parameters:

| Analysis/Method | Matrix | # of samples |
|-------------------------------------------------------------------------------------------------------|-------------|--------------|
| Metals Pb,Cd,As,Zn/NIOSH 7300 | MCEF filter | 20 |
| Data package <u>including diskette deliverables*</u> as per CLP or attached Deliverables Requirements | | |

Samples are expected to arrive at your laboratory on June 12th, 1992. All applicable QA/QC analysis will be performed on our sample matrix. A preliminary data package including a signed copy of our Chain of Custody is due at REAC on June 26th, 1992, with the complete data package by July 13, 1992. If your laboratory cannot meet the delivery date, please give best delivery date possible.

Should any questions or problems arise concerning this project, please call Debbie Weeks at (908)603-8023. For any billing questions, please call Cindy Snyder at (908) 632-9200. Thank you.

Sincerely,

Misty Barkley
Analytical Projects Control Group Leader
Roy F. Weston, Inc. / REAC Project

MB:dw Attachments

The estimated cost of this project will be \$1300.00.

cc. R. Singhvi
 S. Burchette
 Central File
 4642Con.axia

V. Kansal
Subcontracting File
Sample Receiving

C. Snyder
T. Bourbon
Debbie Weeks

00007

AXIA SERVICES, INC.
INDUSTRIAL HYGIENE LABORATORY
REPORT OF LABORATORY SAMPLE ANALYSIS

Debbie Wocher
 Bay K. Wooten
 Woodbridge Avenue
 Building 205; Bay K
 Edison, NJ 08837

Report Number: 23906

Date Received: 06/15/92
 Date Analyzed: 06/16/92

Account Code: A-15704
 Project Number: 3307-31-01-4642
 Sampling Location: Richardson flats
 Method of Analysis: Inductively Coupled Plasma Emission Spectroscopy - NIOSH 7300

| Sample Identification | Air Volume (Liters) | Arsenic (mg/m ³) | Zinc (mg/m ³) | Cadmium (mg/m ³) | Lead (ug/m ³) |
|-----------------------|---------------------|------------------------------|---------------------------|------------------------------|---------------------------|
| 10251 A | 4816 | < 0.0002 | < 0.0001 | < 0.0001 | < 1.5 |
| 10253 A | 4663 | < 0.0021 | < 0.0001 | < 0.0001 | < 1.5 |
| 10252 A | 4862 | < 0.0021 | < 0.0001 | < 0.0001 | < 1.4 |
| 10257 A | 4990 | < 0.0020 | < 0.0001 | < 0.0001 | < 1.4 |
| 10259 A | 5121 | < 0.0020 | < 0.0001 | < 0.0001 | < 1.4 |
| 10261 BLK | Blank | < 0.01 mg | < 0.0005 mg | < 0.0005 mg | < 7 ug |
| 10267 A | 6331 | < 0.0016 | < 0.0001 | < 0.0001 | < 1.1 |
| 10269 A | 5182 | < 0.0019 | < 0.0001 | < 0.0001 | < 1.4 |
| 10263 A | 4587 | < 0.0022 | < 0.0001 | < 0.0001 | < 1.5 |
| 10265 A | 4155 | < 0.0024 | < 0.0001 | < 0.0001 | < 1.7 |
| 10271 A | 5121 | < 0.0020 | < 0.0001 | < 0.0001 | < 1.4 |
| 10274 | Blank | 0.01 mg | < 0.0005 mg | < 0.0005 mg | < 7 ug |
| 10275 | Blank | < 0.01 mg | < 0.0005 mg | < 0.0005 mg | < 7 ug |
| 10261 BL2 | Blank | < 0.01 mg | < 0.0005 mg | < 0.0005 mg | < 7 ug |
| 10261 BL3 | Blank | < 0.01 mg | < 0.0005 mg | < 0.0005 mg | < 7 ug |
| 10261 BL4 | Blank | < 0.01 mg | < 0.0005 mg | < 0.0005 mg | < 7 ug |
| 10261 BL5 | Blank | < 0.01 mg | < 0.0005 mg | < 0.0005 mg | < 7 ug |

Comments: 1. The less than (<) designation indicates that sample results were less than quantitation limits.
 2. 10257 and 10271 filter torn and partially unseated.
 3. Bay #20259A contained filter #10260.

John T. Patricio
 John T. Patricio, Laboratory Director
 Aetna Life & Casualty
 575 Pigeon Hill Road
 Windsor, CT 06095
 Conveyor: W101
 (203) 883-3647

Patricia Murray
 Patricia Murray, I.H. Chemist
 Analyst

c: Tony Maleski, AXIA Services, Inc., VVV4

ANAL ACCREDITED LABORATORY #2

F 65 001

AETNA LIFE AND CASUALTY INDUSTRIAL HYGIENE LABORATORY
METALS DATA WORKSHEET (AIR SAMPLES)

Analyst: PATTI
 Return to: PATTI
 Account Name: BOY J. WESTON
 Attention: DESEIR WELLS
 Address: EDISON, NJ

Circle One: AIAA AETNA
 Circle One: INSP ASPER IN MAIL-IN
 Report Number(s): 23906

Account Code: A-13704

Reference Number:

Date Received: 6/15/92

Abbreviations:

Date Analyzed: 6/15/92

Comments:

Method: inductively Coupled Plasma Emission Spectroscopy (ICP)

Aetna Methods 11, 13, 14, 18

Quality Control: IN OUT

| Sample ID | Sample | Sample | | Blank | Air | RESULTS | DQ |
|--------------|--------|--------|--------------|-------|------|---------|-----------|
| | | Volume | Blank Volume | (mL) | (mL) | | |
| 10265A | As | 0.956 | 10 | 10 | 1.00 | 4155 | <0.001 |
| | Zn | 0.031 | 10 | 10 | 0.05 | 4155 | <0.001 |
| | Cd | 0.003 | 10 | 10 | 0.05 | 4155 | <0.001 |
| | Pb | 0.280 | 10 | 10 | 0.70 | 4155 | 1.63 |
| 10271A | As | 0.957 | 10 | 10 | 1.00 | 5121 | <0.001 |
| | Zn | 0.033 | 10 | 10 | 0.05 | 5121 | 0.10 |
| | Cd | 0.023 | 10 | 10 | 0.05 | 5121 | 0.10 |
| | Pb | 0.297 | 10 | 10 | 0.70 | 5121 | 1.4 |
| 10274 | As | 1.006 | 10 | 10 | 1.00 | 0 | 0.001 |
| | Zn | 0.041 | 10 | 10 | 0.05 | 0 | 0.001 |
| | Cd | 0.023 | 10 | 10 | 0.05 | 0 | 0.001 |
| | Pb | 0.266 | 10 | 10 | 0.70 | 0 | <7.00g |
| 10275 | As | 0.911 | 10 | 10 | 1.00 | 0 | <0.01mg |
| | Zn | 0.041 | 10 | 10 | 0.05 | 0 | <0.0005mg |
| | Cd | 0.024 | 10 | 10 | 0.05 | 0 | <0.0005mg |
| | Pb | 0.246 | 10 | 10 | 0.70 | 0 | <7.00g |
| 10281 H214A | As | 0.905 | 10 | 10 | 1.00 | 0 | <0.01mg |
| | Zn | 0.034 | 10 | 10 | 0.05 | 0 | <0.0005mg |
| | Cd | 0.023 | 10 | 10 | 0.05 | 0 | <0.0005mg |
| | Pb | 0.246 | 10 | 10 | 0.70 | 0 | <7.00g |
| 10281 H231As | As | 0.998 | 10 | 10 | 1.00 | 0 | <0.01mg |
| | Zn | 0.035 | 10 | 10 | 0.05 | 0 | <0.0005mg |
| | Cd | 0.030 | 10 | 10 | 0.05 | 0 | <0.0005mg |
| | Pb | 0.232 | 10 | 10 | 0.70 | 0 | <7.00g |
| 10281 BLA/As | As | 1.015 | 10 | 10 | 1.00 | 0 | 0.01 mg |
| | Zn | 0.038 | 10 | 10 | 0.05 | 0 | <0.0005mg |
| | Cd | 0.026 | 10 | 10 | 0.05 | 0 | <0.0005mg |
| | Pb | 0.321 | 10 | 10 | 0.70 | 0 | <7.00g |
| | As | 0.01 | 10 | 10 | 0.05 | 0 | <0.01mg |
| | Zn | 0.011 | 10 | 10 | 0.05 | 0 | <0.0005mg |
| | Cd | 0.026 | 10 | 10 | 0.05 | 0 | <0.0005mg |
| | Pb | 0.321 | 10 | 10 | 0.70 | 0 | <7.00g |

| | | | |
|---------------------------------|-------------|-----------------|--------------|
| FOR WESTON/REAC USE ONLY | | | |
| Project Name: | WA#: | Report#: | Date: |

| |
|-------------------------------------------------|
| Deliverable Checklist for Metal Analyses |
|-------------------------------------------------|

All the following information must be included in the data package.
 (Please check all blanks and submit the list together with the report)

- Case narrative
- Chain of custody (signed with date of receipt)
- All sample preparation logs (include all re-extractions)
- Compositions of matrix spike solution and the volume used
- Worksheet of % solid or % moisture
- Analysis logs, if applicable
- Tabulated sample results (including the duplicate analysis results)
- Tabulated spike recovery results
- Summary of the calibration curves for all specified elements
- Method numbers for all analytes

Raw Data (Instrument Printouts) for:

- | | |
|-------------------------------------------------------------|-----------------------------------------------------|
| <input type="checkbox"/> Each initial calibration standards | <input type="checkbox"/> Method blank |
| <input type="checkbox"/> ICV | <input type="checkbox"/> MS/MSDs |
| <input type="checkbox"/> CCVs | <input type="checkbox"/> Sample analyses |
| <input type="checkbox"/> ICB | <input type="checkbox"/> Sample dilution analyses |
| <input type="checkbox"/> CCBs | <input type="checkbox"/> Instrument detection limit |

Patricia Murray 1/85
 Signature

6/19/92
 Date

AETNA LIFE & CASUALTY

INDUSTRIAL HYGIENE LABORATORY

REPORT FOR METALS ANALYSIS BY ICP

Control Number: 23906

Date of Analysis: 06/16/1992

| Analyst | Analyte | QC Spike 1 | | QC Spike 2 | |
|---------|---------|------------|-----------|------------|-----------|
| | | Measured | %Recovery | Measured | %Recovery |
| PM | As | 33.19 | 110.6333 | 43.11 | 107.775 |
| PM | Cd | 30.37 | 101.2333 | 40.27 | 100.675 |
| PM | Pb | 30.72 | 102.4 | 40.95 | 102.375 |
| PM | Zn | 30.49 | 101.6333 | 40.32 | 100.8 |

NOTE: QC RECOVERIES BETWEEN 90 AND 110% ARE IN CONTROL.

It's Signature: Patricia Murray

lement: cd Intensity: 67140.0
lement: zn Intensity: 46015.0
lement: pb Intensity: 64430.0
lement: as Intensity: 20735.0

cd EM 10253
pb EM 10823

REPLICATE #2

as EM 5889
zn EM 3898
cd EM 9925
pb EM 10965

BLANK

REPLICATE #3

as EM 5673
zn EM 3833
cd EM 9746
pb EM 10744

| | | | | | | | |
|----|----|---------|----|-------|----|----------|-------|
| as | AV | 5803.0 | SD | 114.5 | CV | 2.0 CONC | 0.000 |
| zn | AV | 3845.7 | SD | 47.3 | CV | 1.2 CONC | 0.000 |
| cd | AV | 9974.7 | SD | 257.1 | CV | 2.6 CONC | 0.000 |
| pb | AV | 10844.0 | SD | 112.0 | CV | 1.0 CONC | 0.000 |

STANDARD #1

REPLICATE #1

1003 6/16/92

zn EM 47128
cd EM 68013

STANDARD #1

REPLICATE #2

zn EM 46801
cd EM 68950

STANDARD #1

REPLICATE #3

zn EM 47371
cd EM 68296

| | | | | | | | |
|----|----|---------|----|-------|----|----------|-------|
| zn | AV | 47100.0 | SD | 286.0 | CV | 0.6 CONC | 1.000 |
| cd | AV | 68419.7 | SD | 480.6 | CV | 0.7 CONC | 1.000 |

STANDARD #2

REPLICATE #1

1006 6/16/92

as EM 21054
pb EM 66341

STANDARD #2

REPLICATE #2

as EM 21021
pb EM 65700

STANDARD #2

REPLICATE #3

as EM 21399
pb EM 66417

F65 011

| | | | | | | | |
|----|----|---------|----|-------|----|----------|--------|
| as | AV | 21158.0 | SD | 209.4 | CV | 1.0 CONC | 10.000 |
| zn | AV | 16478.7 | SD | 209.3 | CV | 0.6 CONC | 10.000 |

b1 sample

REPLICATE #3

| | | | | | |
|----|--|-------|--|--|-------------|
| as | | 0.372 | | | peak-noisy |
| zn | | 0.035 | | | window-edge |
| cd | | 0.011 | | | window-edge |
| pb | | 0.159 | | | peak-noisy |

| | | | | | | |
|----|----|-------|----|--------|----|-------|
| as | AV | 0.354 | SD | 0.0228 | CV | 6.44 |
| zn | AV | 0.038 | SD | 0.0026 | CV | 6.75 |
| cd | AV | 0.013 | SD | 0.0022 | CV | 17.61 |
| pb | AV | 0.134 | SD | 0.0236 | CV | 17.63 |

c 30 ug

REPLICATE #1

1019 6/16/92

| | | |
|----|--|-------|
| as | | 3.148 |
| zn | | 3.039 |
| cd | | 3.000 |
| pb | | 3.145 |

c 30 ug

REPLICATE #2

| | | |
|----|--|-------|
| as | | 3.357 |
| zn | | 3.040 |
| cd | | 3.096 |
| pb | | 3.072 |

c 30 ug

REPLICATE #3

| | | |
|----|--|-------|
| as | | 3.452 |
| zn | | 3.068 |
| cd | | 3.015 |
| pb | | 2.999 |

| | | | | | | |
|----|----|-------|----|--------|----|------|
| as | AV | 3.319 | SD | 0.1559 | CV | 4.70 |
| zn | AV | 3.049 | SD | 0.0164 | CV | 0.54 |
| cd | AV | 3.037 | SD | 0.0516 | CV | 1.70 |
| pb | AV | 3.072 | SD | 0.0726 | CV | 2.36 |

c 40 ug

REPLICATE #1

1023 6/16/92

| | | |
|----|--|-------|
| as | | 4.191 |
| zn | | 4.048 |
| cd | | 4.024 |
| pb | | 4.147 |

c 40 ug

REPLICATE #2

| | | |
|----|--|-------|
| as | | 4.414 |
| zn | | 4.026 |
| cd | | 4.015 |
| pb | | 4.078 |

gc 40 ug

REPLICATE #3

| | | |
|----|--|-------|
| as | | 4.328 |
| zn | | 4.022 |
| cd | | 4.041 |
| pb | | 4.061 |

| | | | | | | |
|----|----|-------|----|--------|----|------|
| as | AV | 4.311 | SD | 0.1124 | CV | 2.61 |
| zn | AV | 4.032 | SD | 0.0142 | CV | 0.35 |
| cd | AV | 4.027 | SD | 0.0127 | CV | 0.32 |
| pb | AV | 4.095 | SD | 0.0455 | CV | 1.11 |

| | | | | | | |
|----|--|-------|--|--|--|-------------|
| as | | 0.811 | | | | peak-noisy |
| zn | | 0.056 | | | | |
| cd | | 0.023 | | | | window-edge |
| pb | | 0.235 | | | | |

| | | | | | | |
|----|----|-------|----|--------|----|------|
| as | AV | 0.837 | SD | 0.0419 | CV | 5.01 |
| zn | AV | 0.054 | SD | 0.0018 | CV | 3.30 |
| cd | AV | 0.024 | SD | 0.0012 | CV | 4.89 |
| pb | AV | 0.229 | SD | 0.0066 | CV | 2.88 |

0253A **REPLICATE #1** 1046 6/16/92

| | | | | | | |
|----|--|-------|--|--|--|------------|
| as | | 0.639 | | | | peak-noisy |
| zn | | 0.041 | | | | |
| cd | | 0.025 | | | | |
| pb | | 0.229 | | | | |

0253A **REPLICATE #2**

| | | | | | | |
|----|--|-------|--|--|--|------------|
| as | | 0.761 | | | | |
| zn | | 0.044 | | | | |
| cd | | 0.023 | | | | peak-noisy |
| pb | | 0.242 | | | | |

0253A **REPLICATE #3**

| | | | | | | |
|----|--|-------|--|--|--|--|
| as | | 0.862 | | | | |
| zn | | 0.042 | | | | |
| cd | | 0.023 | | | | |
| pb | | 0.265 | | | | |

| | | | | | | |
|----|----|-------|----|--------|----|------|
| as | AV | 0.821 | SD | 0.0528 | CV | 6.44 |
| zn | AV | 0.043 | SD | 0.0013 | CV | 3.12 |
| cd | AV | 0.024 | SD | 0.0009 | CV | 4.02 |
| pb | AV | 0.245 | SD | 0.0183 | CV | 7.46 |

0252A **REPLICATE #1** 1049 6/16/92

| | | | | | | |
|----|--|-------|--|--|--|-------------|
| as | | 0.821 | | | | |
| zn | | 0.059 | | | | window-edge |
| cd | | 0.021 | | | | peak-noisy |
| pb | | 0.243 | | | | peak-noisy |

0252A **REPLICATE #2**

| | | | | | | |
|----|--|-------|--|--|--|-------------|
| as | | 0.938 | | | | |
| zn | | 0.061 | | | | window-edge |
| cd | | 0.024 | | | | peak-noisy |
| pb | | 0.284 | | | | |

0252A **REPLICATE #3**

| | | | | | | |
|----|--|-------|--|--|--|-------------|
| as | | 0.880 | | | | peak-noisy |
| zn | | 0.064 | | | | window-edge |
| cd | | 0.024 | | | | peak-noisy |
| pb | | 0.237 | | | | peak-noisy |

| | | | | | | |
|----|----|-------|----|--------|----|-------|
| as | AV | 0.880 | SD | 0.0586 | CV | 6.66 |
| zn | AV | 0.061 | SD | 0.0024 | CV | 3.90 |
| cd | AV | 0.023 | SD | 0.0017 | CV | 7.40 |
| pb | AV | 0.255 | SD | 0.0256 | CV | 10.05 |

ppm std **REPLICATE #1** 1053 6/16/92

| | | | | | | |
|----|--|--------|--|--|--|-------------|
| as | | 10.458 | | | | |
| zn | | 0.055 | | | | window-edge |
| cd | | 9.992 | | | | |

STANDARD #2

| | | |
|----|----|-------|
| as | EM | 22232 |
| pb | EM | 68776 |

REPLICATE #2

| | | |
|----|----|-------|
| as | EM | 22277 |
| pb | EM | 67706 |

REPLICATE #3

| | | | | | | | |
|----|----|---------|----|-------|----|----------|--------|
| as | AV | 22232.0 | SD | 45.0 | CV | 0.2 CONC | 10.000 |
| pb | AV | 67994.7 | SD | 684.3 | CV | 1.0 CONC | 10.000 |

10257A

| | | |
|----|--|-------|
| as | | 0.928 |
| zn | | 0.042 |
| cd | | 0.037 |
| pb | | 0.307 |

REPLICATE #1

1105 6/16/92

peak-noisy

10257A

| | | |
|----|--|-------|
| as | | 0.932 |
| zn | | 0.047 |
| cd | | 0.028 |
| pb | | 0.284 |

REPLICATE #2

peak-noisy
window-edge

10257A

| | | |
|----|--|-------|
| as | | 0.937 |
| zn | | 0.046 |
| cd | | 0.027 |
| pb | | 0.264 |

REPLICATE #3

peak-noisy

| | | | | | | |
|----|----|-------|----|--------|----|-------|
| as | AV | 0.932 | SD | 0.0049 | CV | 0.52 |
| zn | AV | 0.045 | SD | 0.0028 | CV | 6.17 |
| cd | AV | 0.031 | SD | 0.0054 | CV | 17.76 |
| pb | AV | 0.285 | SD | 0.0217 | CV | 7.62 |

10259A

| | | |
|----|--|-------|
| as | | 0.945 |
| zn | | 0.034 |
| cd | | 0.028 |
| pb | | 0.340 |

REPLICATE #1

1109 6/16/92

peak-noisy
peak-noisy
peak-noisy

10259A

| | | |
|----|--|-------|
| as | | 0.948 |
| zn | | 0.033 |
| cd | | 0.027 |
| pb | | 0.304 |

REPLICATE #2

window-edge
window-edge
window-edge

10259A

| | | |
|----|--|-------|
| as | | 1.004 |
| zn | | 0.039 |
| cd | | 0.027 |
| pb | | 0.323 |

REPLICATE #3

peak-noisy
peak-noisy
window-edge

| | | | | | | |
|----|----|-------|----|--------|----|------|
| as | AV | 0.965 | SD | 0.0332 | CV | 3.44 |
| zn | AV | 0.035 | SD | 0.0032 | CV | 9.06 |
| cd | AV | 0.027 | SD | 0.0010 | CV | 3.46 |
| pb | AV | 0.322 | SD | 0.0181 | CV | 5.62 |

STANDARD #1

REPLICATE #1

1325 6/16/92

F55'017

| | | | | | | |
|----|--|--------|--|--|--|-------------|
| as | | 10.430 | | | | |
| zn | | 0.057 | | | | window-edge |
| cd | | 9.979 | | | | |
| pb | | 10.317 | | | | |

| ppm std | | REPLICATE #3 | | | | |
|---------|--|--------------|--|--|--|-------------|
| as | | 10.122 | | | | |
| zn | | 0.057 | | | | window-edge |
| cd | | 10.482 | | | | |
| pb | | 10.283 | | | | |

| | | | | | | |
|----|----|--------|----|--------|----|------|
| as | AV | 10.239 | SD | 0.1669 | CV | 1.63 |
| zn | AV | 0.058 | SD | 0.0017 | CV | 3.01 |
| cd | AV | 10.242 | SD | 0.2523 | CV | 2.46 |
| pb | AV | 10.339 | SD | 0.0698 | CV | 0.68 |

| | | | | | | |
|-------|-----|---|--|-----------|----|--------------|
| 10261 | blk | 1 | | REPLICATE | #1 | 1337 6/16/92 |
| | as | | | 0.948 | | |
| | zn | | | 0.037 | | |
| | cd | | | 0.032 | | window-edge |
| | pb | | | 0.287 | | peak-noisy |

| | | | | | | |
|-------|-----|---|--|-----------|----|-------------|
| 10261 | blk | 1 | | REPLICATE | #2 | |
| | as | | | 0.917 | | peak-noisy |
| | zn | | | 0.040 | | |
| | cd | | | 0.025 | | peak-noisy |
| | pb | | | 0.226 | | window-edge |

| | | | | | | |
|-------|-----|---|--|-----------|----|------------|
| 10261 | blk | 1 | | REPLICATE | #3 | |
| | as | | | 0.941 | | peak-noisy |
| | zn | | | 0.040 | | |
| | cd | | | 0.024 | | |
| | pb | | | 0.278 | | |

| | | | | | | |
|----|----|-------|----|--------|----|-------|
| as | AV | 0.935 | SD | 0.0162 | CV | 1.74 |
| zn | AV | 0.039 | SD | 0.0017 | CV | 4.45 |
| cd | AV | 0.027 | SD | 0.0045 | CV | 16.71 |
| pb | AV | 0.264 | SD | 0.0327 | CV | 12.42 |

| | | | | | | |
|-------|------|--|--|-----------|----|--------------|
| 10261 | blk2 | | | REPLICATE | #1 | 1346 6/16/92 |
| | as | | | 0.997 | | |
| | zn | | | 0.034 | | |
| | cd | | | 0.022 | | peak-noisy |
| | pb | | | 0.211 | | window-edge |

| | | | | | | |
|-------|------|--|--|-----------|----|------------|
| 10261 | blk2 | | | REPLICATE | #2 | |
| | as | | | 0.847 | | peak-noisy |
| | zn | | | 0.034 | | |
| | cd | | | 0.023 | | |
| | pb | | | 0.301 | | peak-noisy |

| | | | | | | |
|-------|------|--|--|-----------|----|-------------|
| 10261 | blk2 | | | REPLICATE | #3 | |
| | as | | | 0.870 | | window-edge |
| | zn | | | 0.036 | | |
| | cd | | | 0.025 | | peak-noisy |
| | pb | | | 0.227 | | |

| | | | | | | |
|----|----|-------|----|--------|----|------|
| as | AV | 0.905 | SD | 0.0811 | CV | 8.96 |
| zn | AV | 0.034 | SD | 0.0011 | CV | 3.10 |
| cd | AV | 0.023 | SD | 0.0011 | CV | 4.82 |

O263A

REPLICATE #3

| | | | | | | |
|----|--|-------|--|--|--|------------|
| as | | 0.903 | | | | |
| zn | | 0.044 | | | | |
| cd | | 0.023 | | | | peak-noisy |
| pb | | 0.236 | | | | peak-noisy |

| | | | | | | |
|----|----|-------|----|--------|----|-------|
| as | AV | 0.893 | SD | 0.0475 | CV | 5.32 |
| zn | AV | 0.044 | SD | 0.0013 | CV | 2.96 |
| cd | AV | 0.021 | SD | 0.0029 | CV | 13.73 |
| pb | AV | 0.260 | SD | 0.0212 | CV | 8.16 |

O ppm std

REPLICATE #1 1359 6/16/92

| | | | | | | |
|----|--|--------|--|--|--|-------------|
| as | | 10.049 | | | | |
| zn | | 0.059 | | | | window-edge |
| cd | | 10.568 | | | | |
| pb | | 10.858 | | | | |

O ppm std

REPLICATE #2

| | | | | | | |
|----|--|--------|--|--|--|--|
| as | | 10.466 | | | | |
| zn | | 0.059 | | | | |
| cd | | 10.524 | | | | |
| pb | | 10.768 | | | | |

O ppm std

REPLICATE #3

| | | | | | | |
|----|--|--------|--|--|--|--|
| as | | 10.379 | | | | |
| zn | | 0.059 | | | | |
| cd | | 10.559 | | | | |
| pb | | 10.562 | | | | |

| | | | | | | |
|----|----|--------|----|--------|----|------|
| as | AV | 10.298 | SD | 0.2201 | CV | 2.14 |
| zn | AV | 0.059 | SD | 0.0004 | CV | 0.64 |
| cd | AV | 10.550 | SD | 0.0229 | CV | 0.22 |
| pb | AV | 10.729 | SD | 0.1519 | CV | 1.42 |

ppm std

REPLICATE #1

1403 6/16/92

| | | | | | | |
|----|--|-------|--|--|--|--|
| as | | 0.912 | | | | |
| zn | | 1.089 | | | | |
| cd | | 1.089 | | | | |
| pb | | 1.264 | | | | |

ppm std

REPLICATE #2

peak-noisy

| | | | | | | |
|----|--|-------|--|--|--|--|
| as | | 0.873 | | | | |
| zn | | 1.091 | | | | |
| cd | | 1.071 | | | | |
| pb | | 1.347 | | | | |

ppm std

REPLICATE #3

peak-noisy

| | | | | | | |
|----|--|-------|--|--|--|--|
| as | | 0.936 | | | | |
| zn | | 1.095 | | | | |
| cd | | 1.080 | | | | |
| pb | | 1.235 | | | | |

| | | | | | | |
|----|----|-------|----|--------|----|------|
| as | AV | 0.907 | SD | 0.0318 | CV | 3.51 |
| zn | AV | 1.092 | SD | 0.0029 | CV | 0.27 |
| cd | AV | 1.080 | SD | 0.0091 | CV | 0.84 |
| pb | AV | 1.282 | SD | 0.0584 | CV | 4.56 |

O265A

REPLICATE #1

1418 6/16/92

| | | | | | | |
|----|--|-------|--|--|--|--|
| as | | 0.905 | | | | |
| zn | | 0.032 | | | | |

F65 021

| | | | | | | |
|----|----|-------|----|--------|----|------|
| as | AV | 1.006 | SD | 0.0115 | CV | 1.14 |
| zn | AV | 0.041 | SD | 0.0016 | CV | 4.00 |
| cd | AV | 0.023 | SD | 0.0009 | CV | 4.10 |
| pb | AV | 0.285 | SD | 0.0093 | CV | 3.26 |

0275 REPLICATE #1 1436 6/16/92

| | | | | | | |
|----|--|-------|--|--|-------------|--|
| as | | 0.917 | | | window-edge | |
| zn | | 0.043 | | | window-edge | |
| cd | | 0.026 | | | peak-noisy | |
| pb | | 0.266 | | | | |

0275 REPLICATE #2

| | | | | | | |
|----|--|-------|--|--|-------------|--|
| as | | 0.909 | | | window-edge | |
| zn | | 0.041 | | | window-edge | |
| cd | | 0.023 | | | peak-noisy | |
| pb | | 0.241 | | | | |

0275 REPLICATE #3

| | | | | | | |
|----|--|-------|--|--|-------------|--|
| as | | 0.905 | | | peak-noisy | |
| zn | | 0.039 | | | window-edge | |
| cd | | 0.024 | | | peak-noisy | |
| pb | | 0.236 | | | window-edge | |

| | | | | | | |
|----|----|-------|----|--------|----|------|
| as | AV | 0.911 | SD | 0.0062 | CV | 0.68 |
| zn | AV | 0.041 | SD | 0.0021 | CV | 5.09 |
| cd | AV | 0.024 | SD | 0.0016 | CV | 6.44 |
| pb | AV | 0.248 | SD | 0.0161 | CV | 6.50 |

0 ppm std REPLICATE #1 1440 6/16/92

| | | | | | | |
|----|--|-------|--|--|--|--|
| as | | 1.002 | | | | |
| zn | | 1.072 | | | | |
| cd | | 1.067 | | | | |
| pb | | 1.255 | | | | |

0 ppm std REPLICATE #2

| | | | | | | |
|----|--|-------|--|--|------------|--|
| as | | 0.950 | | | peak-noisy | |
| zn | | 1.082 | | | | |
| cd | | 1.103 | | | | |
| pb | | 1.264 | | | | |

0 ppm std REPLICATE #3

| | | | | | | |
|----|--|-------|--|--|--|--|
| as | | 0.962 | | | | |
| zn | | 1.084 | | | | |
| cd | | 1.055 | | | | |
| pb | | 1.317 | | | | |

| | | | | | | |
|----|----|-------|----|--------|----|------|
| as | AV | 0.971 | SD | 0.0272 | CV | 2.80 |
| zn | AV | 1.080 | SD | 0.0063 | CV | 0.59 |
| cd | AV | 1.075 | SD | 0.0252 | CV | 2.34 |
| pb | AV | 1.279 | SD | 0.0335 | CV | 2.62 |

0 ppm std REPLICATE #1 1443 6/16/92

| | | | | | | |
|----|--|--------|--|--|-------------|--|
| as | | 10.391 | | | | |
| zn | | 0.064 | | | window-edge | |
| cd | | 10.764 | | | | |
| pb | | 10.712 | | | | |

0 ppm std REPLICATE #2
10.767

| | | | | | | | |
|-------|-----|----|-----------|----|-------------|---------|-------|
| 10261 | blk | S | REPLICATE | #1 | 1455 | 6/16/92 | |
| | as | | 1.007 | | | | |
| | zn | | 0.031 | | | | |
| | cd | | 0.029 | | | | |
| | pb | | 0.309 | | | | |
| 10261 | blk | S | REPLICATE | #2 | | | |
| | as | | 0.979 | | peak-noisy | | |
| | zn | | 0.034 | | | | |
| | cd | | 0.027 | | peak-noisy | | |
| | pb | | 0.352 | | peak-noisy | | |
| 10261 | blk | S | REPLICATE | #3 | | | |
| | as | | 0.911 | | peak-noisy | | |
| | zn | | 0.016 | | peak-noisy | | |
| | cd | | 0.029 | | window-edge | | |
| | pb | | 0.309 | | | | |
| | as | AV | 0.966 | SD | 0.0494 | CV | 5.11 |
| | zn | AV | 0.027 | SD | 0.0094 | CV | 34.87 |
| | cd | AV | 0.028 | SD | 0.0010 | CV | 3.44 |
| | pb | AV | 0.323 | SD | 0.0245 | CV | 7.57 |
| 10261 | blk | S | REPLICATE | #1 | 1501 | 6/16/92 | |
| | as | | 1.019 | | peak-noisy | | |
| | zn | | 0.032 | | | | |
| | cd | | 0.028 | | window-edge | | |
| | pb | | 0.345 | | peak-noisy | | |
| 10261 | blk | S | REPLICATE | #2 | | | |
| | as | | 1.009 | | | | |
| | zn | | 0.033 | | | | |
| | cd | | 0.030 | | | | |
| | pb | | 0.324 | | peak-noisy | | |
| 10261 | blk | S | REPLICATE | #3 | | | |
| | as | | 1.017 | | | | |
| | zn | | 0.031 | | | | |
| | cd | | 0.029 | | | | |
| | pb | | 0.341 | | | | |
| | as | AV | 1.015 | SD | 0.0053 | CV | 0.53 |
| | zn | AV | 0.032 | SD | 0.0011 | CV | 3.29 |
| | cd | AV | 0.029 | SD | 0.0012 | CV | 4.01 |
| | pb | AV | 0.337 | SD | 0.0113 | CV | 3.36 |

| | | | | | |
|------------|---------|--------|--------|--------|--------|
| 05 | 6/16/92 | 0.932 | 0.045 | 0.031 | 0.285 |
| 259A | as | zn | cd | pb | |
| 6/16/92 | 0.965 | 0.035 | 0.027 | 0.322 | |
| TANDARD #1 | zn | cd | | | |
| 25 | 6/16/92 | 1.000 | 1.000 | | |
| TANDARD #2 | as | pb | | | |
| 28 | 6/16/92 | 10.000 | 10.000 | | |
| ppm std | as | zn | cd | pb | |
| 330 | 6/16/92 | 0.851 | 1.023 | 1.031 | 1.230 |
| 0 ppm std | as | zn | cd | pb | |
| 333 | 6/16/92 | 10.239 | 0.058 | 10.242 | 10.339 |
| 0261 blk 1 | as | zn | cd | pb | |
| 337 | 6/16/92 | 0.935 | 0.039 | 0.027 | 0.264 |
| 0261 blk2 | as | zn | cd | pb | |
| 346 | 6/16/92 | 0.905 | 0.034 | 0.023 | 0.246 |
| 0267 A | as | zn | cd | pb | |
| 349 | 6/16/92 | 0.922 | 0.037 | 0.022 | 0.230 |
| 0269A | as | zn | cd | pb | |
| 352 | 6/16/92 | 0.892 | 0.053 | 0.021 | 0.272 |
| 3A | as | zn | cd | pb | |
| 6/16/92 | 0.893 | 0.044 | 0.021 | 0.260 | |
| 0 ppm std | as | zn | cd | pb | |
| 359 | 6/16/92 | 10.298 | 0.059 | 10.550 | 10.729 |
| ppm std | as | zn | cd | pb | |
| 403 | 6/16/92 | 0.907 | 1.092 | 1.080 | 1.282 |
| 0265A | as | zn | cd | pb | |
| 418 | 6/16/92 | 0.956 | 0.031 | 0.023 | 0.280 |
| 0271A | as | zn | cd | pb | |
| 428 | 6/16/92 | 0.957 | 0.052 | 0.023 | 0.297 |
| 0274 | as | zn | cd | pb | |
| 432 | 6/16/92 | 1.006 | 0.041 | 0.023 | 0.285 |
| 0275 | as | zn | cd | pb | |
| 436 | 6/16/92 | 0.911 | 0.041 | 0.024 | 0.248 |
| ppm std | as | zn | cd | pb | |
| 440 | 6/16/92 | 0.971 | 1.080 | 1.075 | 1.279 |
| 0 ppm std | as | zn | cd | pb | |
| 443 | 6/16/92 | 10.544 | 0.063 | 10.657 | 10.695 |
| 0261 blk 3 | as | zn | cd | pb | |
| 447 | 6/16/92 | 0.998 | 0.035 | 0.030 | 0.292 |